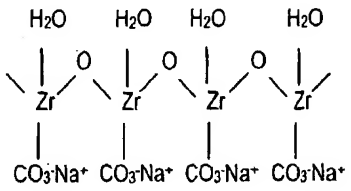
~~SODIUM ZIRCONIUM CARBONATE AND ZIRCONIUM BASIC CARBONATE~~ ZIRCONIUM PHOSPHATE AND METHODS OF MAKING THE SAME

This application is a divisional of U.S. Patent Application No. 09/723,396 filed November 28, 2000, which is incorporated in its entirety by reference herein.

BACKGROUND OF THE INVENTION

The present invention relates to sodium zirconium carbonate, zirconium phosphate, and zirconium basic carbonate and methods of making these compounds.

Sodium Zirconium Carbonate (SZC) is an amorphorous zirconium polymeric compound with the structural formula as shown:



Molecular Structure of SZC before Titration

($NaZrO_2CO_3 \bullet nH_2O$)

The granular form of the material can be obtained by the following two methods:

Method A: Reaction of granular zirconium basic sulfate with a saturated soda ash solution followed by washing the product to remove the sulfate.

Method B: Controlled polymeric particle growth reaction of a metastable sodium zirconium carbonate solution formed by mixing a soluble zirconium salt solution with an excessive amount of soda ash solution.

One industrial application of granular SZC is the conversion of the material to zirconium basic carbonate (ZBC) which is a commercial raw material in making other zirconium chemical products. The conversion can be made by titrating the granular SZC to pH 3.5 – 4.0 with an acid to remove the excessive sodium carbonate. The granular SZC used for making ZBC is usually produced by Method A. Another important application of SZC is the conversion of the material to the granular zirconium chemical ion exchangers, namely, zirconium phosphate (ZrP) and hydrous zirconium oxide (HZO). These zirconium